

ingly he made many investigations upon special quartic curves, both plane and twisted; he considered the meaning of a focus of a curve traced on a sphere, showing that the method of inversion changed the ordinary foci of such a curve into foci of the inverse curve; he published many investigations upon a class of loci to which at the time considerable attention was paid, anallagmatic curves and surfaces. Other papers treat of the cyclide of Dupin, the curve of intersection of two quadric surfaces, and a family of curves called by Laguerre Cassinians: and it is to be noted that while writing upon a particular curve he would at times include theorems of wider application.

A passing mention may be accorded to an interesting statement of the addition theorem of hyperelliptic functions closely resembling that derived from Poncelet's polygons in elliptic functions; to researches upon Steiner's Roman surface and its reciprocal, known as Cayley's cubic surface, and other applications of the theory of forms to geometry. Finally, at the end of the book we meet with a series of papers in which Laguerre's discovery of *geometry of direction* is developed. The idea from which this sprang is elementary enough; a straight line or a circle may be traced out by a moving point in two opposite senses, and therefore is regarded by Laguerre as composed of two "half-lines" or two cycles. The notion of tangency is modified when a curve is described in a definite direction, so that a cycle is regarded as possessing one tangent only parallel to a given half-line. Following up this thought, Laguerre is led to divide all curves into curves of direction, which can be divided analytically into two trajectories traced out in different senses, and curves which have not this property; he finds the form of the tangential equation of the most general curve of direction. By help of a highly ingenious "transformation by reciprocal half-lines," it is shown how certain problems may be greatly simplified; the problem of drawing a circle to touch three given circles, for example, is reduced to that of drawing a circle through three points. The theory is extended also to spherical geometry.

Laguerre's life-work in geometry forms a volume which no mathematician can study without being profoundly impressed by the ingenuity of the author and his skill in handling every method which he employs; papers such as his, models of clear polished style, are read with keen intellectual enjoyment. Yet when the book is laid down and we reflect on the work as a whole, there comes a regretful conviction that what has been accomplished is very far from all that could have been hoped for from the powers of the author and his brilliant first achievement. Delicate in health and of retired life, Laguerre's isolation from the march of scientific thought is betrayed in his writings. General notions appealed to him solely by their applicability to particular problems, and he therefore chose to bestow the utmost care upon a number of short discussions of special topics. Let the reader, if he would appreciate what is best in these collected writings of

Laguerre, realise when he takes up the book that its author was one of those who are content to apply to small things' powers capable of far higher work, and he will find matter to arouse his interest and admiration in every paper reprinted in the volume.

PHILOSOPHICAL STUDIES.

- (1) *Goethe's Philosophie aus seinen Werken*. Edited with an introduction, by Max Heynacher. Pp. viii + 428. (Leipzig: Dürr'sche Buchhandlung 1905.) Price 3.60 marks.
- (2) *Immanuel Kant, Physische Geographie*. Second edition. Edited by Paul Gedan. Pp. xxx + 386. (Leipzig: Dürr'sche Buchhandlung, 1905.) Price 2.50 marks.
- (3) *Dialoge über natürliche Religion, über Selbstmord und Unsterblichkeit der Seele*. By David Hume. Translated into German and edited by Dr. F. Paulsen. Third edition. Pp. 165. (Leipzig: Dürr'sche Buchhandlung, 1905.) Price 1.50 marks.
- (4) *Immanuel Kant's Kleinere Schriften zur Logik und Metaphysik*. Second edition. Edited by Karl Vorländer. In four parts. Pp. xxxii + 169, xl + 172, xx + 175, xxxi + 176. (Leipzig: Dürr'sche Buchhandlung, 1905.) Price 5.20 marks.
- (5) *G. W. F. Hegel, Encyclopädie der philosophischen Wissenschaften im Grundrisse*. Second edition. Edited by Georg Lasson. Pp. lxxvi + 522. (Leipzig: Dürr'sche Buchhandlung, 1905.) Price 3.60 marks.

(1) **G**OETHE'S work was so many-sided, and withal so voluminous, that it is a real service to educated thought to have presented, as here, a volume of extracts, in moderate compass, containing in his own words an account of the great writer's philosophic and scientific views, and of the influences exerted on him by different systems. Herder, Spinoza and Kant all obviously attracted him at various times, and his name must find a place in any account of the theory of colour or of comparative anatomy—to name only two of the scientific subjects in which he was interested. With these and kindred matters the editor deals in a well-informed introduction. He knows the literature well, his Eckermann, the Goethe Jahrbuch, and Goethe's poetry. Goethe's title to be regarded as a forerunner of Darwin is duly emphasised.

(2) That Kant should thus have lined the wings of his spirit in the dregs of the sensible world will astonish the average reader, for this work condescends to minute details regarding the animal, vegetable, and mineral kingdoms, the characteristics of different races of men, and the like. Even one of the earlier parts, dealing with mathematical preliminaries, is not at all speculative in its nature, and only one or two paragraphs in the introduction, which point out that geography deals with facts in space as history with events in time, remind us of the Critique of Pure Reason; but the services of Kant to geography are not negligible, and have been attested by Helmholtz.

The present edition contains a full statement of

variant readings, and many corrections of the text due to this editor.

(3) Hume's dialogues on natural religion run on much the usual lines. The characters are three in number, Demea the representative of believing scepticism, Philo of unbelieving scepticism, and Cleanthes of conciliatory rationalism. But there is this peculiarity in Hume's treatment, that, while there is no doubt that his own standpoint is that of Philo, he has chosen to make Cleanthes the hero, and concludes his work with the opinion that Philo's principles are more probable than Demea's, but that those of Cleanthes approach still nearer to the truth. The essays on suicide and on the immortality of the soul have been preserved only by accident, as their author attempted to suppress them. The German translation and introduction are from the pen of the well known professor in Berlin, and, like everything published in this philosophical series, are excellent.

(4) This volume contains about fifteen of Kant's smaller metaphysical and logical works, some of them translated from Latin, some of them written before the birth of the "critical" philosophy, not all of them interesting or important. They range over a variety of themes, from the dreams of a spiritist (viz. Swedenborg) to the well known prize-essay on the progress of metaphysics since the time of Leibniz and Wolf. This editor's introductions to the various essays and treatises are extremely helpful and interesting.

(5) The encyclopædia, the only complete and authentic statement of Hegel's system—best known to English readers by the late Prof. Wallace's translations of its first and third parts—is here published in an excellent form. In the introduction the editor discusses (a) the fundamental ideas of the Hegelian philosophy; (b) philosophy as science; (c) the encyclopædia, and Hegel's relation to earlier systems.

OUR BOOK SHELF.

The Oxford Geographies. Vol. ii. The Junior Geography. By A. J. Herbertson. Pp. 288. (Oxford: Clarendon Press, 1905.) Price 2s.

WHEN a school-book treats of the geography of the whole world in less than 300 pages of large, clear print, interspersed with abundant diagrams, its claim to compete with the ordinary class-book must be based on the substitution of quality for quantity, wise selection and arrangement for all-including comprehensiveness. The book before us may fairly make such a claim. There is nothing of the gazetteer about it: its method is that of connected description; in place of statistical tables we have an abundance of distribution-maps, and continents and countries are divided according to physical features more than by political boundaries. Thus in the case of England the counties are entirely ignored, and the pupil is spared the necessity of learning as many "facts" about Oxfordshire as about Lancashire. So, too, in the case of Europe, there is a special section on Alpine lands, which renders possible a connected account of the railway routes across the Alps, and should prevent the common misconception of the Alps as coextensive with the political area of Switzerland.

Nearly one-third of the book is occupied with the British Isles, and about as much with Europe, the

remainder being about equally divided between Asia, Africa *plus* Australia, and America. It would be easier to form a judgment on the opening part if the "Preliminary Geography," which is intended to precede it, had been published. As it stands, this opening part, consisting of a large number of distribution-maps (orographical, climatic, industrial, &c.) of the British Isles, with a discussion of their meaning and relations, is full of suggestiveness to the enthusiastic teacher, and in his hands is capable of expansion into a course of practical geography.

In such a book the critic can, of course, find plenty of missing "facts," though we have found remarkably few of first-rate importance. Several which we failed to find in the text turned up in the maps, which is just as well in view of the importance which the author attaches to the study of maps. ("Look at the map and notice . . ." is a constantly recurring phrase.) Chicago, it is true, appears to be only casually mentioned on p. 262, without any allusion to its unique geographical position with reference to the Mississippi basin and the great lakes; and along with the trans-Alpine routes to which we have already referred we should have expected to find some account of the longitudinal route of the Orient express. While the numerous diagram-maps form one of the best features of the book, their execution is unequal, the lettering on some being indistinct and the shading sometimes amateurish. In the map of the chief North American railways the names of the lines might be given as far as possible, and the route of the projected Grand Trunk Pacific continued to Port Simpson instead of ending at Winnipeg; while in Fig. 22 it seems unnecessary to distinguish part of the Scotch coal-fields merely because the coal is of Lower Carboniferous age. A. M. D.

Organic Evolution. By C. W. Saleeby, M.D. Pp. 124. (London and Edinburgh: T. C. and E. C. Jack, n.d.) Price 1s. net.

DR. SALEEBY has written a little book on a great subject, and there is much to admire in his achievement. Without technicalities and with vivacious clearness he discusses the history of the idea of organic evolution, the so-called evidences which show the validity of the evolution-formula, the conditions of evolution (heredity and variation) and the factors in the process (natural and sexual selection), the evolution of plants, the history of the horse, the past and future evolution of man. And we can get all this for a shilling! The author writes in an unconventional chatty way, and is nothing if not up to date. He seems, however, to have written in hot haste, for he makes many slips. Perhaps it does not matter much that he speaks of Alfred Russel Wallace as being in 1858 "a young surgeon," but it is hard on the whale to have it said of him that his five "fingers, hand and all, are buried deep in blubber, and serve him no purpose whatever." Surely Dr. Saleeby's teacher, Sir William Turner, to whom he gracefully refers, will be rather shocked at this libel on the whale's flipper. Perhaps it does not matter much that a certain Matthew Hay (Patrick Matthew?) is credited with having conceived the idea of natural selection in the early years of the nineteenth century, but we are somewhat baffled by being twice told that while the hen has three and a half fingers, the embryo chick has a *five-fingered hand*. If we dissect the embryo we shall see this, we are told. We do not like Dr. Saleeby's version of the lineage of extinct forms "which continuously connect the horse of to-day with a five-toed ancestor," but we object still more to the statement that "the adult or fully-developed barnacle is far inferior to the larva, for it